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The Design and Creation of an Interactive E-Book: “Book of Answer”

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ABSTRACT Interactive E-book is a digital book which the reader can direct the storyline and interact with it. ‘The book of answer’ is a kind of popular book that reader can interact with. In this project, we aim to develop an PVE game to simulating the process that the reader interact with the computer with the content of the book saved in. We use Python to realize the interactive dialogue process in GUI (Graphical User Interface).

1. Background

E-book refers to the type of book that is published in a digital form. Like the ebooks that we can find on Amazon and Kindle, ebook has changed the concept of books from heavy to light and portable. Besides, normally, E-book is cheaper than traditional paper book. Also, E-books are convenient to carry on. Those features make E-book popular now.

Interactive E-book, literally, is a E-book that reader can interact with. In charging with the E-book is a wonderful user experience while reading. Users can control the page choosing, video playing and context reading by themselves

‘Book of Answer’ (Carol Bolt,2016) is a popular book with difference words in each page. Once people want to find an answer, they just need to consider about a question before they page to a randomly number with an answer on the blank. The book is very popular because of its interesting, unexpected, unpredictable answer and its randomness. Lots of people found their answer in the book and treat it as a tool to soothe the mind when they face any trouble.

In terms of the book ‘The book of Answer’ is a paperback 640 pages heavy book. It is impractical to carry the book during the journey, working or other situation. Considering the book’s attributes of interesting and high interaction, it would be a wonderful material for an interactive E-book. Therefore, The research proposes to develop a interactive E-book system with the materials come from ‘Book of Answer’. Occupy the ‘Book of answer’ in interactive E-book would build a ‘Game-like’ reading experience. The E-book will turn the page and get the answer dependent on the reader.

2. Literature Review

Nowadays, the latest interactive E-book product such as ‘Campbell Biology’, ‘Running in the Gauntlet ’ and there also are some software to make interactive book released like Moglue and SnapAPP. Besides there are some provoking essay showing very significant information and method. There is a successful sample of interactive E-book, which is, ‘Campbell Biology’ (Jane B. Reece .et al, 2010). The 1600 pages book can be displayed by a pad following the instruction by readers to perform



the video, audio, hot spot including in the E-book, The essay ‘Designing and Building an Interactive E-Book’ described. (Maria Bartoszewicki, 2013) There are some buttons and mouse sensing area designed to make a chance for reader to interact during the reading in order to construct an imitation of reality users experience. (Yuanyuan Min, 2010)

Applying E-book as an interactive role into higher education can make a great difference in study. Mohammed Mohammed Ahmed Ebied has done his experiment for 60 students and gave the readers an unexpected answer that:

There is a significant differences between the study groups in academic achievement favor to experimental group students whose study with e-book. (Mohammed, 2015)

Of course, iPad or iPhone can play the same role in graduating student study. But less attention has been paid to children. (Huang, Yueh Min, 2012) Clare claimed that the advantages of interactive E-book that the storyline can be developed by user and content displaying in more interesting way like 3D diagrams and other tricky. It also shows the successful example of interactive E-book, such as ‘Running in the Gauntlet’ (Jeffrey Hayzlett, 2012), which used Snap Tags to attract many users. (Clare mcdermott, 2012) For the method to create a interactive E-book, a very basic, easy-learned and functional software named MoglueBuilder has been introduced to build a interactive E-book. This software designed for ordinary people, thus it does not need the ability of programming. User control the storyline by drag and pulling in the UI. According to the essay, it is obviously that the interactive E-book will became more and more popular and common. (Annie, 2012)

Based on the articles gathered, a summery can be drawn that the interactive Ebook introduce a enjoyment way of reading. Because of the popularization of those easy-mastered software and promising developing future, one day it will develop as the main-string reading method.

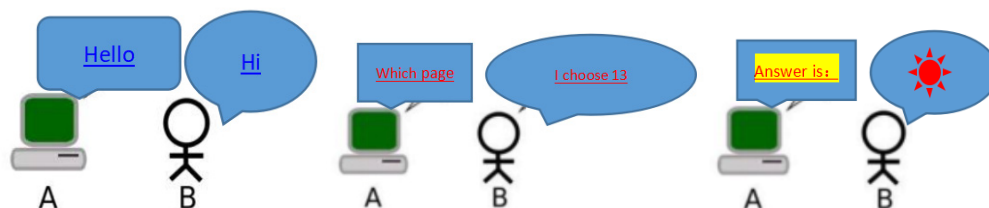
Except for increasing the interestingness of reading, the development of interactive E-book also can be manipulated learning difficult and unpredictable things, such as natural catastrophe and disaster. The outcome turned out as a optimistic view:

The results reveal that the attention of users can be improved and the image can also be improved during the interaction and operation process. Finally, this study proves that the interactive electronic book makes learning easier and faster than the traditional book. (Shih, 2013)

Not only in this field, the E-learning can be built as a template to do the study in order to save the labor and time. Hatipoglu has explained his research and method to do the E-book learning problems and shared his steps. (Hatipoglu, 2012)

3. Proposal

This project aims at designing and creating an interactive E-book of ‘Book of Answer’ with python. This programme simulates the process of ‘choosing page’ and ‘showing answer’ actions via programming in python. Thus there are two windows needed in this project. One for asking and one for answering. The demo created in the project can work like the interactive dialogue system as figure 1 shown. The ebook would allow us to interact with users, allow users to choose pages, and our system would provide the answers for them. Therefore, we need to develop the programme that can accept the data produced by users and read the Ebook document. Finally get the right answer and display it to customers.



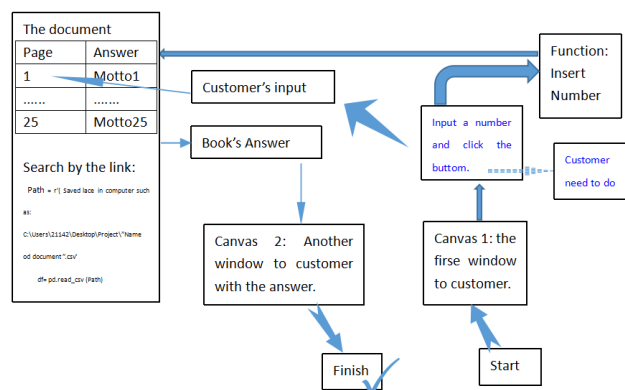
(Figure 1)

4. Framework:

Our interactive E-book of “Book of Answers” is fulfilled by several models in Python, such as GUI, Pandas, Tkinter, Dataframe and easygui. GUI (Graphical User Interface) can create an environment that the customers can chat with computer by graphical icons. Pandas (The data analysis library) is a package that can build a data structure and do the data analysis. In the project, It is used to process the data in DataFrame. Tkinter is a class in the file tkinter, which is a TK GUI toolkit for python binding. In the programming, the import of the module tkinter is the method chosen to create a dialogue window. DataFrame is the data structure for processing data table in Pandas. In the project, It is used as a data source for the computer to read, research as find the right answer. Easygui is also a module for GUI programming. It can be used to create another window to bring out the answer and can be used independently. Just import the module and use it after the function Insert number triggered. It is a relatively simple and easy to use module in python, which is good for who new to python.

Due to the copyright of the book, the research only use the document of ‘Book of Answer’ with 25 pages and 25 answers and it is saved as a csv form with the index: Page number. One page number only correspond to a very answer. Once customers input a very page number, the computer will get the corresponding answer based on the saved document. In the programming, the vital parts are constructing the function, setting the parameter of each label, button on the canvas and combining the two canvas together with the button which is used to command the function. While running the programme, the canvas will be shown on the window to ask ‘Which page would you like to choose’, after the customer inputs a certain number and clicks the ‘Enter’ button, then Another canvas will show up to give the answer.

The development has 3 steps. Firstly, A data table to be established to store the page number and answers then save it as a csv mode. That is the source where the computer can get the data. Secondly, A function will be built to combine the data table and the customer’s instruction. Thirdly, A window will be constructed for customers to input and polish the dialogue canvas. Here is a diagram shown below: (Figure 2)



(Figure 2)

5. Pseudo-code

The code will be shown as three parts which corresponding the threes steps which has been mentioned above:

5.1 The definition of function ‘insert number’

```

def insert_number():
    global x1
    x1 = int(entry1.get())
    f = r'C:\Users\21142\Desktop\Project\DataFrame.csv'
  
```

```
df= pd.read_csv (f)
easygui.msgbox('Here is your Answer:'+ df['Here is your Answer: '][x1])
```

Firstly an entry will be made as x1 and give a path f to guide the programme read the document. The key word [x1] in the last row ensure the only right answer to print out. The method easygui is used to build the second window for presenting the answer.

5.2 The definition of a canvas

```
canvas1 = tk.Canvas(root, width = 350, height = 200,bg='violet')
canvas1.pack()
l=tk.Label(root,bg='green',width=50,height=5,text='Welcome to the "Book of Answer"')
l.pack()
n=tk.Label(root,bg='yellow',width=50,height=5,text='Which page would you like to choose')
Pack
m=tk.Label(root,bg='blue',width=50,height=3,text='Thank you')
m.pack()
```

Establish four packs for the first window. Build canvas1 and three labels on the canvas. At last determine the parameter for it, such as the length, width, background color and the content of the label. The order of the code determines the place located on the canvas.

5.3 The definition of the Button

```
button1 = tk.Button (root, text='Enter ',command=insert_number)
canvas1.create_window(250, 100, window=button1)
```

The button for customers to click is a command to trigger the function 'insert number'. Also some parameter will be set to determine its place on the canvas1.

6. Solved improvement

During the programming, the easiest way to solve it is that listing all the answer in the code script and make it as a select button mode. Such as:

```
def print_selection():
    l.config(text='Here is your answer: '+var.get())
r1=tk.button(window,text='Page1',variable=var,value='Thank you',command=print_selection)
r1.pack()
```

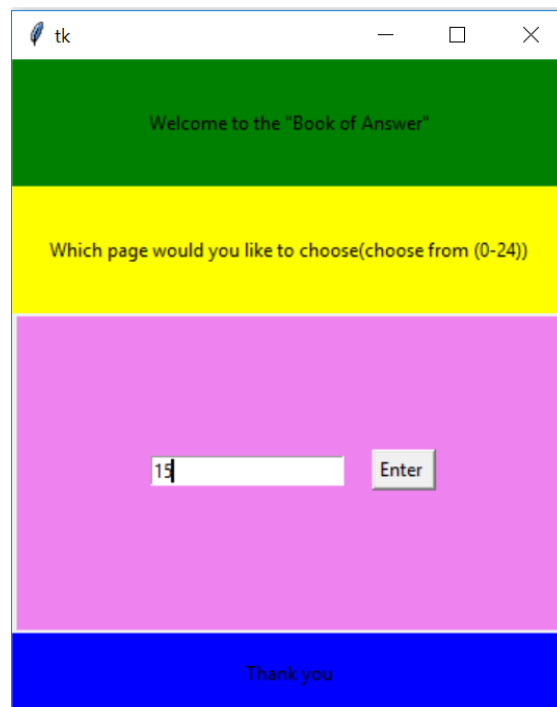
But the number of page of book always should be higher than one hundred. It will be unrealistic to show all the possibilities in the script. Thus the research use the Pandas method to store the large information in the memory and only call them when the command inert button is triggered.

7. The process of running the programme showing below

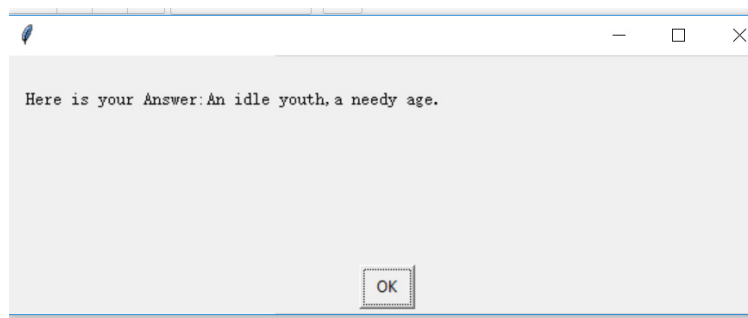
Figure 3 shows the first window to ask the question.

(Customers inset a number and enter the number. In the project, It is set the page number is from 1 to 24)

Figure 4 shows the second window to answer the question.



(Figure 3)



(Figure 4)

8. Conclusion:

The reason to develop the program is that the book can soothe the emotion when people facing trouble. But the book about hundreds of page will be tough to carry on anytime. If people can play the game easily by phone, it will become convenience and portable.

The overcome trouble including the encoding problem, which is to do with the UTF-8 converting, and the function choosing. The tkinter has lots of function parts including Entry, Index and Get method. Also In the project, it is set the page number is from 1 to 24. If one customer input number 0 page, the answer will be none. If the customers input a number over then the largest page number of the customer does not input a rational page number, the programme can give a instruction. (let n=the largest number of page) Such as:

```
(x=int(x))
    if 0<=x<n
        break
    else:
        print('Please choose another page')
except:
    print('Please input a Number').)
```

The demo made in the project is comparable to a interactive dialogue between the computer and user. The interaction between them present by the 'asking' and 'Answering' process. The program can do the debug process to minimize the error. By developing this project, people can interact with the book 'The book of answer' anytime as long as they carried phone. The programme would be improved in the video interface by using bootstrap to get into a website area. Or it also can be develops as a really PVE game in App program. In addition, the content of 'Book of answer' can be changed not only in word, but in audio can video to make the interactive E-book more attractive to customers.

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